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The Citrus Industry

FLORIDA'S EXCLUSIVE CITRUS MAGAZINE...

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# Getting Together

Announcement that representatives of the citrus industry of Florida, California, Texas and Arizona will soon get together to discuss a national citrus program should be heartening to every citrus producer. It is particularly gratifying to this publication, which since its inception, now more than twenty-two years ago, has urged a national program for the growers of all producing sections.

Each of the citrus producing states has its own peculiar problems to face and solve, but there are other problems common to all and which can be solved only by the joint action of all. With the probability that we will have another large yield of all citrus fruits during the coming marketing season, we are faced with new and important problems. Doubtless there will be severe shortage of transportation facilities. Steel and tin will affect our canning industry. Priorities on box and packing materials will play a part. Distribution of fertilizers may be hampered. Then there are the age-old problems of controlled distribution, the disposition of culls, the questions of grade, size and pack, which can be solved only on a nationwide basis.

That such a meeting of representatives of citrus growers from the four states can be of inestimable benefit to all citrus growers there can be no doubt. It is necessary that such representatives gather with open minds and with the determination to face their problems from a nationwide, rather than a statewide, viewpoint. In the long run, what will benefit one section will benefit all.

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Jacksonville, Florida

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Issued Monthly
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Representing no special interest

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# Seasonal Citrus Pointers

By E. F. DeBUSK
District Supervisor and Extension Citriculturist

### Thinning Tangerines

Along with current comments on the condition and probable size of the 1942-43 crop of Florida citrus, the opinion is freely expressed that the tangerine crop will be the largest in the history of the industry. At any rate the crop will be a large one. It is a matter of record that heavy yields in a year of large crops run to a larger percentage of small sizes than are produced in a year of low yields and small crop. It is also a matter of record that small sizes suffer heavier discounts in shipping seasons of large crops. In many instances of the past, small sizes of tangerines have sold at a loss in seasons of large crops. However, the grade and size marketing agreement has largely corrected this in recent years by restricting the marketing of these small sizes. But still the problem of small sizes confronts the producer. Some growers feel that in years of large crops it is profitable to systematically reduce the production of the small sizes by thinning.

In 1929 a study of the effect of thinning tangerines on size was made by the Agricultural Extension Service in the Hartt Grove in Highlands county. The thinning was done about the middle of July when the fruit was running 20 to 40 millimeters in diameter. Since no standard method of thinning had been established, an effort was made to determine the most desirable rate of thinning by removing 33 percent of the fruit from each of five trees, 67 percent from another five, and leaving five check trees, not thinned. The trees were located in such a manner as to provide a random sample of the grove. Eight to nine year-old trees were used. The fruit was pulled and dropped to the ground. Two men worked together on a tree, one picking the higher fruit from a step ladder, while the other picked from the ground. An effort was made to distribute the picking over the branches in a manner so as to actually thin the fruit, taking, of course, the smallest. The thinning cost was 4 to 5 cents a box, by numbers, or 16 to 20 cents a tree. The fruit was sized at picking time.

The following table shows the result of thinning on size increase, yield reduction and price relative:

It is noted in the table of results that, from the trees not thinned, only 54 percent of the fruit was large enough to return the grower a profit; whereas, 69 percent of the fruit from trees thinned one-third off returned a profit, with a loss in boxes of only three percent, resulting from thinning. Where two-thirds of the fruit was removed by thinning, 84 percent of the fruit picked was large enough to return the grower a profit, with a loss of only 19 percent in the total number of boxes. The thinning operations were profitable; the two-thirds removed proved to be more profitable for that season and for that particular grove with a very heavy crop.

### Organic Matter and Nitrogen Conservation

From the beginning of citrus fruit cultivation in Florida, it has been the general practice to supply bulky organic matter to the soils of citrus groves by growing cover crops and

(Continued on page 14)

| Plots | Percent of Standard Sizes | | | | | | | Final Yield Reduced Per cent |
|---|---|---|---|---|---|---|---|---|
| | 250s | 216s | 196s | 168s | 144s | 120s | 108s | |
| Not thinned | 9.7 | 36.0 | 31.6 | 17.4 | 4.8 | .5 | .0 | |
| Thinned, ⅓ off | 5.4 | 25.2 | 35.8 | 25.2 | 7.0 | 1.3 | .1 | 2.8 |
| Thinned, ⅔ off | 2.6 | 13.7 | 32.0 | 32.3 | 16.2 | 2.7 | .5 | 18.8 |
| Relative prices of sizes current season | -19 | 00 | 24 | 63 | 100 | 60 | 54 | |

# Relationship Between Rind Blemishes & Juice Quality . . . In Florida Oranges

By ERSTON V. MILLER, Physiologist, Division Fruit and Vegetable Crops & Diseases, Bureau of Plant Industry, U. S. D. A., Orlando, At Florida State Horticultural Society Meeting

### Introduction

The relationship between rind blemishes and juice quality in citurs fruits is still a much debated question. As a typical example, one is frequently told that russeted fruit is sweeter than bright fruit. However, this phase of the question received considerable attention a few years ago when Yothers and Mason (3) reported that while the two types of fruits contained approximately the same percentage of soluble solids, the russett fruit showed slightly more acid. In other words they found the facts contrary to the general beliefs.

The object of the investigation which is being reported here is not so much to revive the issue of sweetness or sourness in these two types of fruit as to direct attention to another constituent of the juice which certainly determines quality, namely, ascorbic acid or vitamin C. It would seem that this question might assume additional importance during the present war emergency when many more of the "off-colored" oranges are being marketed not only as fresh fruits but also as canned juices and concentrates. It is a well known fact that the price of fruit is discounted because of a certain amount of rind blemishes. Both producer and consumer naturally ask the question, "Does a lower price in this case indicate lower nutritive value?"

### Methods and Materials

These studies were made by the U. S. Department of Agriculture in the laboratory at Orlando and were begun in December, 1940. In the investigations on the relationship of rust mite injury to juice quality the fruit was collected from eight different groves, three of which were located in central Florida, near Orlando, and five on the east coast. In each grove ten trees were selected which showed a high percentage of fruits with rust mite injury. Ten bright and ten russeted fruit were picked from each tree, care being taken not to pick fruit from the inside branches. These hundred oranges were later culled down to 25. Fruit in the russeted sample showed fifty per cent or more of its surface discolored. The samples of bright and russet fruit from the same grove were matched as far as possible for size.

### Results

First it will be noted that the results for solids and acids reported in this paper verify those published by Yothers and Mason. Although the values for total soluble solids fluctuated within each group, there was very little difference in the group averages. In table 1 it will be observed that soluble solids for the bright fruit ranged from 11.33 to 12.49% and averaged 12.02%; whereas, in the russeted fruit the range was from 11.33 to 12.53% with an average of 12.00%.

The acids, on the other hand, were consistently a little higher in the russeted oranges than in the bright fruits, ranging from 1.24 to 1.74% for the former and from 1.06 to 1.68% in the latter. The average for total acid was 1.31% in the bright fruit and 1.47% in the russet. The slightly lower acid in the bright fruit naturally raised the solids-to-acids ratio.

The ascorbic acid (vitamin C) content in these two types of oranges appeared somewhat like those for total soluble solids. In six out of the eight lots this constituent was lower in the russet fruit than in the bright. In the other two lots ascorbic acid in the russet fruit was equal to or slightly higher than that in the bright. In the bright oranges ascorbic acid ranged from .485 to .656 mg. per cc.; in the russet, the range was from .478 to .606 mg. per cc. When averaged the values were .556 mg. per cc. for the russet fruit and .574 mg. per cc. for the bright oranges.

It will be observed that while the fruits tested in the experiments just described were selected as being badly discolored, they probably would be marketable as low grade russets. In order to obtain samples that were not quite so extreme, the following experiments were conducted on fruit selected in commercial packing houses. Each sample consisted of 25

Table 1. Solids, acids, and ascorbic acid content of bright and russet mid-season oranges

| Variety | Root-stock | Source | Solids % | | Acids % | | S/A Ratio | | Ascorbic Acid mg. per cc. | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Bright | Russet | Bright | Russet | Bright | Russet | Bright | Russet |
| Seedling | | Central Fla. | 12.49 | 12.39 | 1.68 | 1.74 | 7.40 | 7.09 | .498 | .478 |
| Pineapple | S. O. | Central Fla. | 11.39 | 11.53 | 1.06 | 1.26 | 10.69 | 9.14 | .485 | .469 |
| Pineapple | R. L. | Central Fla. | 11.93 | 12.13 | 1.29 | 1.42 | 9.21 | 8.50 | .624 | .595 |
| Pineapple | S. O. | E. Coast Fla. | 11.83 | 12.13 | 1.06 | 1.24 | 11.08 | 9.75 | .566 | .566 |
| Seedling | | E. Coast Fla. | 11.89 | 12.13 | 1.53 | 1.72 | 7.76 | 7.02 | .611 | .606 |
| Seedling | | E. Coast Fla. | 12.13 | 11.33 | 1.22 | 1.40 | 9.95 | 8.05 | .561 | .539 |
| Pineapple | S. O. | E. Coast Fla. | 12.33 | 12.53 | 1.15 | 1.29 | 10.72 | 9.68 | .597 | .602 |
| Pineapple | S. O. | E. Coast Fla. | 12.23 | 11.89 | 1.54 | 1.74 | 7.93 | 6.82 | .656 | .602 |
| Average | | | 12.02 | 12.00 | 1.31 | 1.47 | 9.34 | 8.25 | .574 | .557 |

fruits, as in the previous experiments. The variety used was Valencia, size 176's. The "brights" consisted of oranges in the No. 1 grade showing the least blemishes, while the "russets" were those with the most blemishes in the No. 2 bin. The first five lots listed in table 2 were discolored mainly by the rust mite and "smooth" melanose. Those in lot F showed mostly melanose. Each lot was collected from a different packing house, one near Orlando, and the others from south central Florida.

Table 2. Solids, acids, and ascorbic acid content of bright and russet Valencia oranges.

| Lot | Solids % | | Acids % | | S/A Ratio | | Ascorbic Acid mg. per cc. | |
|---|---|---|---|---|---|---|---|---|
| | Bright | Russet | Bright | Russet | Bright | Russet | Bright | Russet |
| A | 12.15 | 12.15 | 1.150 | 1.344 | 10.57 | 9.04 | .505 | .470 |
| B | 12.15 | 12.55 | 1.142 | 1.312 | 10.64 | 9.57 | .552 | .579 |
| C | 12.15 | 12.15 | 1.066 | 1.264 | 11.40 | 9.61 | .411 | .404 |
| D | 11.95 | 11.45 | 1.138 | 1.154 | 10.50 | 9.92 | .502 | .454 |
| E | 11.72 | 12.12 | 1.058 | 1.170 | 11.08 | 10.36 | .445 | .437 |
| F | 12.52 | 12.52 | 1.250 | 1.474 | 10.02 | 8.49 | .518 | .500 |
| Avg. | 12.10 | 12.15 | 1.134 | 1.286 | 10.70 | 9.49 | .488 | .474 |

Again the results are very similar to those reported for the fruits showing very severe rust mite injury. Total solids for the bright fruit averaged 12.10%; for the russet, 12.15%. The average for total acid was 1.134% for the bright fruit and 1.286% for the russet.

Ascorbic acid (vitamin C) was lower in the juice of the russet oranges in every instance but one. Consequently the average values were lower for the russet fruit than for bright oranges; .474 mg. per cc. in the former, and .488 mg. per cc. in the latter.

**Discussion**

From a mathematical standpoint there is a significant difference between bright and russet oranges in so far as total acids and vitamin C values are concerned. The differences in total solids are not significant.

For all practical purposes blemishes in the rinds of oranges caused by rust mite and melanose do not seriously affect juice quality. Six people were asked to taste the juices of the midseason oranges described here. One could detect no differenc in the flavor of the juice from the bright and russet fruit. The others found slight differences in three out of the eight lots. When a difference in flavor was noted, the juice from the russet fruit was described as "tart to pleasantly tart" as compared to "pleasantly tart" for the juice of the bright fruit. In one or two instances the juice from the russet fruit was even considered sweeter.

In the samples of Valencia oranges no difference in flavor could be detected in five out of the six lots. In the sixth lot the juice from the russet fruit was considered "tart to pleasantly tart."

Furthermore oranges showing rind blemishes might be considered a satisfactory source for ascorbic acid. According to the American Medical Association (1) the daily requirements of this vitamin are 8 to 50 mg. for infants, 22 to 100 for children, and 28 to 100 mg. or more for adults. Considering the average for the two grades of Valencias shown in Table 2, the bright fruit would supply 117 mg. in a half pint glass of juice, and the russet, 113 mg. That is, there would be 4 mg. less in the glass of juice from the rusest fruit. To equalize the vitamin C content we should need an extra teaspoonful of the juice from the russet fruit. Or let us consider one of the extreme cases — the lot of pineapple oranges in which the ascorbic acid content of the bright fruit was .656 and that for the russet .602 mg. per cc. The difference would amount to about 12 mg. in an eight ounce glass of juice and could be compensated for by an extra two teaspoonfuls of juice from the russet fruit.

There is the suggestion that the oranges showing rind blemishes may have been protected from direct sunlight at some time during the growing period. It has previously been shown (2) that oranges on the inside branches of the tree are slightly lower in vitamin C content and slightly higher in total acids. It is known that the rust mite is more prone to attack part shaded fruit and that melanose is usually produced by spore-laden moisture dropping from infected twigs above; so it might be that certain environmental factors that result in lowered vitamin C content happen at the same time to be favorable for development of those common forms of rind blemish. The important thing to know is that juice quality is not seriously affected by rind blemishes caused by rust mite and melanose, which constitute the principal blemishes found on Florida citrus fruit.

**Literature Citations**

(1) The Vitamins. American Medical Association. 1939.
(2) Harding, Paul L., Winston, J. R., and Fisher, D. F. Seasonal Changes in Florida Oranges. United States Department of Agriculture Technical Bulletin 753. 1940.
(3) Yothers, W. W., and Mason, Arthur C. The Citrus Rust Mite and Its Control. U. S. Department of Agriculture Technical Bulletin 176. 1930.

## CO-OP BANK HEAD SUGGESTS FARMERS OBTAIN SUPPLIES

Due to the critical transportation situation throughout the country, L. G. Foster, president of the Columbia Bank for Cooperatives, has advised all member associations in the Third District of the Farm Credit Administration of the importance of obtaining adequate supplies of such items as containers, packages, coal, fuel oil and other bulky commodities that may be immediately stored for future use.

"Any commodities requiring rail shipments should be secured at the earliest date convenient to the borrowers of our bank," Mr. Foster said. "Should the associations need financial assistance in preparing for the year ahead, please feel free to write us in Columbia, S. C., concerning their problems. We believe it would be wise for the associations particultrly those handling fertilizer, to place their orders now with their sources of supply to take care of their fertilizer requirements for the coming year."

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University of Florida School of Forestry students are helping to protect Northwestern forests against fires and sabotage this summer.

# The Citrus Industry

with which is merged The Citrus Leaf
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## CITRUS GROWERS HAD GOOD SEASON

According to the Florida Citrus Commission, the marketing season for Florida citrus fruits just closed was the best Florida growers have experienced in many years.

It is estimated that the dollar return to growers on the tree was $55,000,000, an increase of $20,000,000 over the previous season. The market valuation at point of delivery is estimated at $124,500,000 compared with a total of $110,000,000 for the preceding crop.

Grapefruit, oranges and tangerines all shared in the increased return to the growers. In 1940-41, the tangerine grower received an average of 59 cents per box on the tree for his fruit, while during the 1941-42 season the average was $1.70 per box on the tree, almost three times the return for the previous year. The auction average jumped from $2.90 in 1940-41 to $3.60 in 1941-42.

Oranges brought an average of nearly $1.25 per box on the tree. The auction average was $2.82. The average cost of getting a box of oranges from tree to market is estimated at $1.60, leaving an average of $1.22 as the per box value on the tree. Thus the 27,300,000 boxes of oranges shipped from the state had an on tree value of $33,000,000 an increase of fifty percent over the on tree value of the 1940-41 crop of Florida oranges which was $22,000,000.

Grapefruit growers during the season just closed averaged slightly more than $1.00 per box on tree, as against an average of 47 cents per box the previous season. The auction averages for Florida grapefruit was $2.52. Counting $1.50 as the cost from tree to market, which is the generally accepted figure, the grower received an average price of $1.02. Total auction sales of grapefruit amounted to slightly more than 19,000,000 boxes, giving the grower an on tree value of slightly more than $19,000,000, as against an on tree value of $11,000,000 the previous year.

Of course, all growers did not receive as much as the indicated average, but others received more. As always, the producer of the better fruit received the premium.

## STUDY LONG-RANGE PLAN

A suggestion by R. D. Keene of Winter Garden, president of the Growers and Shippers League of Florida, that Florida citrus growers take steps to acquire and operate their own ships after the war for the distribution of their fruits, has received the endorsement of the Florida Citrus Commission.

The suggestion followed an increase of 6½ cents in Florida citrus rates to Eastern markets which became effective July first, and reports that the carriers would seek still further changes in the rate structure as it affects citrus shipments.

Feeling that the industry is now paying all it can stand, if not a little more, and that it will be hard to secure lower rates after the war, Mr. Keene and his associates contend that steps should be taken now to meet after-the-war conditions.

Members of the Florida Citrus Commission agreed with this view and a committee of twenty representative shippers and canners was named by Commission Chairman Thomas B. Swann to investigate the possibilities of the proposed plan. Mr. Keene was made chairman of the special investigating committee.

Certainly the industry is now taxed almost to the limit of its capacity to pay, and some method of reducing transportation costs should be found. The plan proposed by Mr. Keene seems to have possibilities in that direction and those possibilities should be thoroughly surveyed.

## DEALER BONDS AGGREGATE NEARLY MILLION

J. F. Mays, head of the bond and license division of the state citrus inspection bureau, states that Florida citrus fruit dealers posted $967,650 in bonds during the 1941-42 season for protection of growers under the state's bond and license law enacted by the 1935 legislature. This sum compares with $790,950 for the previous season.

During the year 340 packing houses were registered, although 36 registered houses did not operate; 21 registration certificates were issued to shippers who did not operate their own packing houses, and 10 canning plant registration certificates were used for the maturity season under state law.

During the year 187 complaints were handled by the department, and nearly $18,000 was paid to growers by bonding companies, by far the largest sum paid in any year since the bonding law became effective.

In submitting its report, the department of agriculture states that the bond and license law is operating to weed out "fly-by-night" and speculative operators who operate only during seasons of good prices and good demand and usually to the detriment of the growers and legitimate dealers.

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With the shipment of a near-record citrus crop just closed, the growers of Florida are now looking forward to a shipping season which promises to present new and trying problems for solution.

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Proper grove practices now will return profits later.

# Effect of Thinning on Some of the Physical and Chemical Characters of Valencia Oranges...

By PAUL L. HARDING, Horticulturist, and Robt. M. Dyer, jr., Minor Scientific Helper, Division of Fruit & Vegetable Crops & Diseases, Bureau Plant Industry, U. S. D. A. 1/, at Meeting Florida State Horticultural Society.

During the last ten years much experimentation has been conducted on the thinning of fruits, particularly from the standpoint of the leaf-to-fruit ratio. These investigations have dealt mostly with deciduous fruits, such as the apple. The ultimate objectives were to increase the size of individual fruits and to reduce the crop on biennial-bearing trees during the "on" year, so that these trees would produce a crop during what would normally be the "off" year. The tendency to biennial-bearing has not been as critical a problem with citrus trees as with apple trees; therefore, the subject of thinning and leaf-area in relation to yield and the composition of the fruit has received little attention by citriculturists.

The purpose of this preliminary report is to point out some of the effects of fruit thinning on the physical and chemical characters of Valencia oranges (Citrus sinensis (L) Osbeck) grown on rough lemon and sour orange rootstocks.

**Material and Methods**

The twelve Valencia orange trees used in this study were located in a commercial grove at Windermere, Florida. Six were on rough lemon rootstock and six on sour orange. The trees were about 30 years of age, in good physical condition, and growing on Norfolk fine sandy soil. Thinning the fruit on the entire tree 2/ to increase the leaf-area per fruit was done early in July, 1940, after the fruit dropping period and at a time when the oranges were large enough so that the approximate size of the crop could be estimated. Three trees on each rootstock were thus thinned. Trees were selected that could be expected to yield about ten boxes of fruit each. In the thinning process the crop was reduced to about two boxes per tree, with the fruit systematically spaced. During the summer months weekly inspections were made, and all late-bloom fruits were removed. The control trees carrying the heavy crop were not thinned except to remove the late-bloom fruits.

Samples of 30 oranges were collected at random from the thinned and the control trees from each of the four plots on February 5, April 1, and May 23, 1941. Individual determinations were made for the various constituents on each of the 30 fruits of each sample, but in this report only the means obtained together with their standard errors are presented. Official methods were used in making the chemical analyses, and the results are presented in Tables 1 and 2.

**Discussion of Results**

Thinning increased the size, weight, and volume of juice per fruit. In California, Parker (4, 5) reported that a definite response to thinning was noted after the "June" drop of both Washington Navel and Valencia oranges. This was manifested by the larger size of fruits harvested in the year of thinning and by a reduction of the total crop.

When the amount of juice was computed on the basis of milliliters of juice per 100 grams of fruit (ml./100 grs.), no significant differences were noted between the fruits from the thinned and the fruits from the control trees. It is of interest to note that the most juice was obtained in the sampling made on April 1.

A greater hydrogen-ion concentration (lower pH) was found in the juice of the fruits from the control trees than in fruit juice from the thinned trees grown on rough lemon rootstock, whereas, no appreciable differences were noted between fruits from the thinned and the control trees grown on sour orange stock. Regardless of thinning there was a greater hydrogen-ion concentration in the fruits grown on sour orange than

(Continued on page 10)

1/. Acknowledgements are due Mr. Frank Chase of the Chase Investment Company, Windermere, Florida, for his cooperation, and to Mr. G. Lee Roberts, Agent, Division of Fruit and Vegetable Crops and Diseases, for his assistance in thinning the fruit and in making weekly inspections.

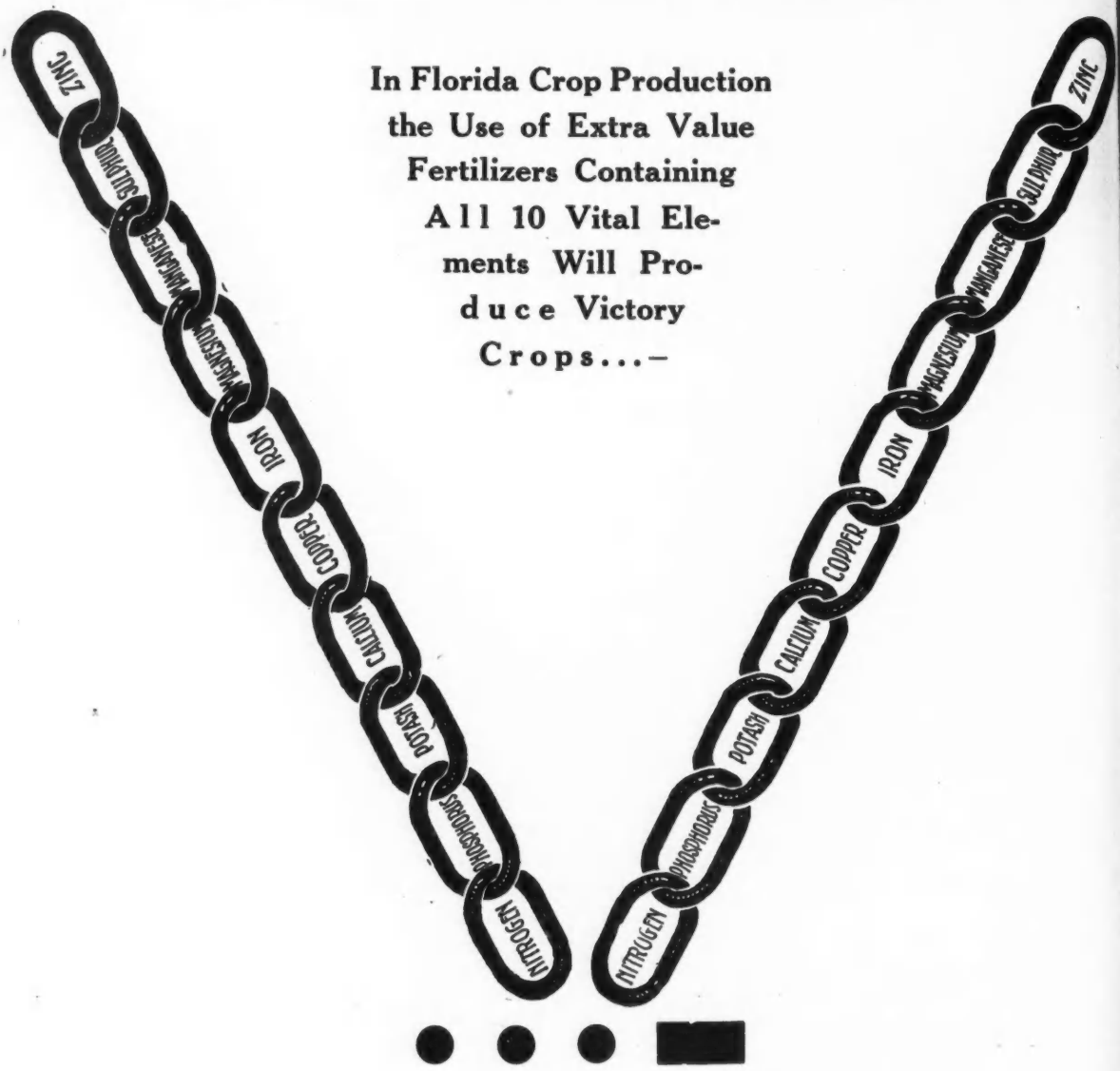
2/. No tests were made on fruits from ringed branches.

Table 1. Effect of thinning on the physical and chemical constituents of Valencia oranges grown on rough lemon rootstock (1).

| Constituents | Thinned (Light Crop) | | | Control (Heavy Crop) | | |
|---|---|---|---|---|---|---|
| | February 5, 1941 | April 1, 1941 | May 23, 1941 | February 5, 1941 | April 1, 1941 | May 23, 1941 |
| Aver. weight per fruit (grs.) | 292 | 302 | 305 | 224 | 228 | 227 |
| Aver. diam. per fruit (Mm.) | 82 (2) | 81 | 83 | 75 (3) | 75 | 75 |
| Aver. thickness rind (Mm.) | 4 | 4 | 4 | 4 | 4 | 4 |
| Vol. junce per fruit (Ml.) | 148+3 | 169+6 | 154+4 | 119+2 | 126+3 | 123+2 |
| Juice per 100 grs. of fruit (Ml.) | 51 | 56 | 50 | 54 | 55 | 54 |
| pH | 3.43 | 3.62 | 3.89 | 3.37 | 3.56 | 3.87 |
| Ascorbic acid (mg./ml.) | 0.49+.009 | 0.45+.002 | 0.32+.008 | 0.51+.009 | 0.47+.01 | 0.37+.007 |
| Total solids (%) | 10.08+.08 | 10.96+.10 | 11.30+.16 | 10.56+.11 | 11.39+.12 | 12.12+.15 |
| Total acid (%) | 1.15+.03 | 0.91+.02 | 0.724+.02 | 1.19+.02 | 0.99+.02 | 0.75+.02 |
| Ratio (TSS/A) | 8.77 | 12.04 | 15.69 | 8.87 | 11.50 | 16.16 |
| Taste | + | + | + | + | ++ | ++ |

(1) All figures represent a mean of 30 determinations.
(2) Size 126
(3) Size 200
\+ Flavor in degrees of taste preference.
(NOTE:—Where Plus (+) sign is used in above table it indicates "plus-or-minus" except those used opposite the taste constituents.)

# VICTORY

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## EFFECT OF THINNING ON SOME OF THE PHYSICAL AND CHEMICAL CHARACTERS OF VALENCIA ORANGES

(Continued from page 7)

in the fruits grown on rough lemon rootstock.

Of particular interest are the results obtained for some of the chemical constituents. During the season of the thinning, the thinned trees showed a more vigorous growth. Although the fruits were larger, they contained a lesser percentage of total solids, total acid, and ascorbic acid than did the smaller fruits from the unthinned or control trees. (See tables 1 and 2.) The synthesized foods resulting from the increased leaf-area were apparently manifested in the larger and coarser textured fruits, in a more vigorous tree growth, and in a slightly heavier crop of fruit the year following the thinning. These observations are similar to the findings of Parker (4), who has pointed out that in the year following the thinning of the fruit, a larger crop was picked from the thinned trees than from the control trees.

Slightly higher values for ascorbic acid, total acid, and total solids were found in the fruits from both the thinned and the control trees grown on sour orange than in those grown on rough lemon rootstock. These results are in agreement with those previously reported (1, 2). The smaller fruits from the control trees contained a higher content of total solids and total acidity than did the larger fruits from the thinned trees; this is in accord with the results reported by Harding and Lewis (3), who pointed out that throughout the various stages of ripening, the smaller sized fruits contain the most solids and acid.

Taste tests were made on the oranges of each sample. There was unanimous agreement to the effect that the smaller fruits produced on the control trees were sweeter and had better flavor and flesh texture than did the larger fruits from the thinned trees. The oranges from the latter trees were about one to two sizes larger and had coarser external and internal texture.

### Summary

Under the conditions of this experiment the drastic thinning of Valencia fruits in July in order to increase the leaf area per fruit resulted in fruits one to two sizes larger and a reduction in the yield from about ten boxes to about two boxes per tree. During the season of the thinning the trees with the lighter crop made a more vigorous growth and produced larger sized fruits and a slightly larger crop the year following the thinning.

From the results obtained in this preliminary study, there does not appear to be any economic or physiological reason for thinning Valencia orange trees in Florida. The trees show very little tendency towards biennial-bearing. Fortunately the fruits on Valencia trees carrying heavy crops are usually of satisfactory size. The texture and flavor were found to be better and the juice had a higher content of total solids and ascorbic acid than did the larger fruits from trees with lighter crops.

Table 2. Effect of thinning on the physical and chemical constituents of Valencia oranges grown on sour orange rootstock (1).

| Constituents | Thinned (Light Crop) | | | Control (Heavy Crop) | | |
|---|---|---|---|---|---|---|
| | February 5, 1941 | April 1, 1941 | May 23, 1941 | February 5, 1941 | April 1, 1941 | May 23, 1941 |
| Aver. weight per fruit (grs.) | 264 | 268 | 270 | 203 | 189 | 219 |
| Aver. diam. per fruit (Mm.) | 79 (2) | 80 | 80 | 73 (3) | 70 | 73 |
| Aver. thickness rind (Mm.) | 4 | 3 | 4 | 4 | 3 | 4 |
| Vol. juice per fruit (Ml.) | 142+4 | 146+4 | 147+4 | 109+2 | 103+3 | 109+2 |
| Juice per 100 grs. of fruit (Ml.) | 54 | 55 | 50 | 54 | 55 | 50 |
| pH | 3.22 | 3.51 | 3.83 | 3.32 | 3.50 | 3.83 |
| Ascorbic acid (mg./ml.) | 0.61+.008 | 0.52+.01 | 0.43+.009 | 0.66+.01 | 0.57+.01 | 0.47+.007 |
| Total solids (%) | 12.10+.09 | 12.83+.11 | 13.58+.14 | 12.86+.11 | 13.52+.13 | 13.96+.13 |
| Total acid (%) | 1.51+.04 | 1.23+.03 | 0.90+.02 | 1.53+.04 | 1.22+.03 | 0.93+.02 |
| Ratio (TSS/A) | 8.01 | 10.42 | 15.09 | 8.41 | 11.08 | 15.01 |
| Taste | + | + | ++ | + | +++ | +++ |

(1) All figures represent a mean of 30 determinations.
(2) Size 150
(3) Size 176
\+ Flavor in degrees of taste preference.
(NOTE:—Where Plus (+) sign is used in above table it indicates "plus-or-minus" except those used opposite the taste constituents.)

### Literature Cited

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## Analysis Of Data Relative To The Maturity Of Florida Early and Midseason Common Sweet Oranges, Seasons 1938, 1939 and 1940

(Concluded from last month)

In 1939, solids were very much lower at the beginning of the season than in either 1938 or 1940 but increased rapidly as the season progressed. During the period of November 12 to 18, 82 percent of the movement met a 9 percent minimum content of solids. This figure compares with 96 percent and 98 percent of the movement that met a 9 percent minimum during the same weekly periods in 1938 and 1940, respect-

ively.

In 1940, solids were higher than during either of the 2 preceding years. Practically 100 percent of the movement of oranges met an 8 percent minimum for soluble solids from the week of October 8 to 14 through the week ended December 30. During the weekly period October 29 to November 4, 95 percent met a 9 percent minimum; 81 percent met a 9.5 percent minimum; and 49 percent had a content of 10 percent or more solids.

The percentage of fruit that contained 9 percent or more solids was lower in 1939 than in 1938 and 1940, especially during the first part of the season. The percentage of solids in 1939, however, increased rapidly and after the middle of November there was relatively little difference in the percentages of oranges that contained 9 percent or more soluble solids during each of the maturity inspection seasons.

### Anhydrous Citric Acid

Table 2 shows the percentages of oranges that met various minimum amounts of anhydrous citric acid during weekly periods in each of the maturity inspection seasons of 1938, 1939, and 1940.

In 1938, 96.6 percent or more of the fruit met a minimum specification of seven-tenths of 1 percent citric acid throughout the season. Practically 100 percent met a minimum of six-tenths of 1 percent.

In 1939, of the oranges moved during the week of October 8 to 14, 77 percent met a minimum acid requirement of seven-tenths of 1 percent. During the following week 80 percent of the fruit met this specification for acid. During each of the following weeks there was a progressive increase in the percentage of fruit that had an acid content of seven-tenths of 1 percent or more. Undoubtedly the progressive increase in the percentages of oranges that met the minimum specifications was due to the increase in movement of mid-season fruit of higher acidity. At least 96 percent of the movement met a minimum of six-tenths of 1 percent acid throughout the maturity inspection season.

In 1940, after the middle of October, nearly all oranges met a minimum acid content of seven-tenths of 1 percent.

Table 4. Percentages of weekly movement of Florida oranges that met the "A" specification 1 in 1938, 1939 and 1940

| Year | Oct. 8-14 | Oct. 15-21 | Oct. 22-28 | Oct. 29 Nov. 4 | Nov. 5-11 | Nov. 12-18 | Nov. 19-25 | Nov. 26 Dec. 2 | Dec. 3-9 | Dec. 10-16 | Dec. 17-23 | Dec. 24-30 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Pct. | Pct. | Pct. | Pct. | Pct. | Pct. | Pct. | Pct. | Pct. | Pct. | Pct. | Pct. |
| 1938 | 57 | 64 | 76 | 82 | 90 | 94 | 97 | 97 | 97 | 98 | 98 | 98 |
| 1939 | 25 | 32 | 42 | 53 | 69 | 75 | 90 | 87 | 93 | 96 | 96 | 98 |
| 1940 | 62 | 72 | 81 | 90 | 92 | 95 | 97 | 97 | --- | --- | --- | --- |
| Average | 48 | 56 | 66 | 75 | 84 | 88 | 95 | 94 | 95 | 97 | 97 | 98 |

Total number of boxes or tests on which this table is based: 1938 ..... 7,403,048 boxes
1939 ..... 7,027 tests
1940 ..... 3,070,515 boxes

Table 5 Total movement through the entire seasons, 1938-39, 1939-40, and 1940-41, and number of carlot equivalents that failed to meet the "A" specifications during the period October 8 through December 30.

| Year | Total movement (Carlot equivalents through entire season | Carlot equivalents that failed to meet "A" specification Oct. 8-Dec. 30 | Percentage of total movement that failed to meet specification |
|---|---|---|---|
| | Number | Number | Percent |
| 1938-39 | 69,317 | 1,783 | 2.6 |
| 1939-40 | 47,386 | 4,532 | 9.6 |
| 1940-41 | 1/ 56,513 | 853 | 1.5 |
| Average | 57,739 | 2,389 | 4.1 |

1/ Total shipments to June 30.

Table 6. Total movement and number of carlot equivalents that failed to meet the "A" specification, October 1-December 30, 1938-40.

| Year | Total movement (Carlot equivalents) from Oct. 1-Dec. 30 | Carlot equivalents that failed to meet "A" specification | Percentage that failed to meet specification |
|---|---|---|---|
| | Number | Number | Percent |
| 1938 | 19,307 | 1,783 | 9.2 |
| 1939 | 19,741 | 4,532 | 23.0 |
| 1940 | 16,025 | 853 | 4.6 |
| Average | 18,358 | 2,389 | 13.0 |

Total number of boxes or tests on which this table is based: 1938 ..... 7,403,048 boxes
1939 ..... 7,027 tests
1940 ..... 3,070,515 boxes

### Volume of Juice

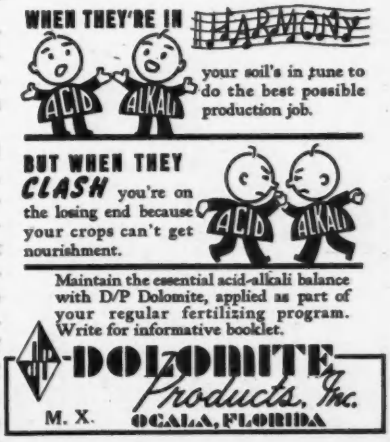
The percentages of oranges that contained various minimum amounts of juice per standard packed 1 3-5 bushel box, by weekly periods from October 8 through December 2 during each of the years 1938, 1939, and 1940, is shown in table 3.

The percentages shown in these tables are averages of composite tests of all sizes of fruit.

In each of the years 1938, 1939, and 1940, during the period from October 15 to December 2, 98 percent or more of the oranges tested contained not less than 4.5 gallons of juice per box.

A comparison shows that during the seasons of 1938, 1939, and 1940, the percentages of oranges that contained minimums of 4.5 and 4.7 gallons did not vary to an appreciable extent after the week of October 8

(Continued on page 15)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## Horticultural Hints

The weather man announced several days ago that a new record had been set for hot weather with the temperature reaching an all time high. In view of this fact it is difficult to make many suggestions for farm and grove work. It is much more comfortable to sit in the shade and take a well deserved rest. However, there are certain operations that must be cared for even in the hottest kind of weather. For example, rust mites are active all over the state, and if you haven't made oil spray, then you should do so at the earliest possible moment. This extremely warm weather is hard on young trees and you should keep a careful check to see that they have been getting plenty of water. Thorough cultivation of the tree row in the case of young trees is advisable, and if you have suitable material we suggest mulching these young trees.

Vegetable growers are getting their seed beds under way. This is a very important operation in determining the success that you will have with the fall crop. It has been our experience that a well prepared seed bed and continued proper care in many cases determines whether you will be successful with the resulting crop or have it a complete failure. We urge all growers to give this matter the proper attention. Select the most desirable land that you have, and if you are not absolutely sure about the chemical condition of this soil we invite you to get in touch with the Lyons Field Man. He will be glad to cooperate with you in obtaining soil samples and finding out what should be done to get this soil in proper condition. It is very costly to have the seed bed turn out to be a failure. Remember a little prevention is more economical than all of the cures.

Now is a very good time for all growers to start looking around and making their labor connections. There is every reason to believe that farm and grove labor will be somewhat harder to get than in former years so start now to making your contacts in order that you will be able to take care of your operations.

Tires and gasoline are needed by the army and other armed forces, and we are making every effort to cooperate. For this reason we might not get around to see you as often as we would like, but we want to assure you that if something develops on the farm or grove where we can be of assistance, communicate with us and we will immediately get in touch with the situation.

## Reports of Lyons Field Men . . .

### POLK AND HIGHLANDS COUNTIES
**J. M. (Jim) Sample**

This section is still getting rains and the cover crops are making good growth. Some chopping and mowing has started and will continue during the summer. Oil sprays are still being applied and in spite of the high daily temperatures very little burning has been reported. Fruit is sizing up rapidly now and the prospects for a satisfactory crop are good. There are several new plantings going on in and around this section with varieties divided about equally between early and late varieties. Groves throughout this section are in very fine condition and have made good summer growth.

### SOUTHWEST FLORIDA
**F. W. (Felton) Scott**

Groves throughout this section are looking extremely well under very favorable weather conditions and the young fruit is sizing up much more rapidly than was anticipated. In spite of the late bloom during the spring fruit should start moving from this section earlier than last season and growers are very optimistic in regard to prices for the coming crop. Growers generally are taking better care of their properties and particularly in regard to secondary elements and the adequate use of spray materials. As a result we are going to have far better quality and a larger yield to offer the market.

### NORTH CENTRAL FLORIDA
**V. E. Bourland**

There is a large area of muck land being prepared for vegetable crops, mainly celery, in the Zellwood section. This area will be ready for cropping in the spring, and we understand that a considerable acreage will be planted at this point. There has been a large acreage of new groves. Many growers are of the opinion that there is more activity being shown in planting now than has been shown in many years. Our fruit crop is showing up somewhat better and the quality is very good. There is some concern here over the prospects of getting ample labor to handle all grove and packing house operation this fall.

### WEST CENTRAL FLORIDA
**E. A. (Mac) McCartney**

As observed last month the early orange crop will be light in this section. However, Valencias have set a good crop, and while our acreage of grapefruit is light we will have more fruit than we did last season. We have had one of the best flushes of summer growth seen in a number of years and groves are in fine condition. In regard to the vegetable sections, there is considerable uncertainity as to what they will be able to do this fall. Many growers have already felt the labor shortage and indications at this time have growers wondering if they will be able to take care of the normal acreage. However, in spite of the many adverse conditions that may arise this fall growers, both vegetable and citrus, are making plans for a normal production season.

### HILLSBOROUGH & PINELLAS COUNTIES
**C. S. (Charlie) Little**

We have a very healthy condition throughout this territory at the present time. Practically all growers had a successful season and those growers that held their Marsh Seedless grapefruit and Valencia oranges until late in the season obtained excellent prices. With this condition existing we are having more money spent on care of grove properties and as a natural result trees are in better condition and we are going to have better quality fruit to place on the market this fall and next spring. The rains have been plentiful for the past weeks and the summer growth is now out in good shape. Conditions have been favorable for growth this summer and groves and growth are in good, healthy, normal condition.

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Mr. F. Gould Garcia, manager, Paramount Grove Service, Lakeland is shown above in one of the fine groves under supervision of his Company.

Mr. Garcia's grove care business is only about four years old but during that time a reputation for honesty and ability to accomplish the desired results at least possible cost has been established, and today this is one of the very successful grove care organizations in the state.

We are proud that Mr. Garcia has made such a fine success for he gives a large share of credit to LYONS FERTILIZERS in maintaining his groves in such fine condition. Lyons Fertilizers have been used exclusively by the Paramount Grove Service.

## SEASONAL CITRUS POINTERS

(Continued from page 3)

applying various green manure crops and animal manure. Records show that back in the Eighties and Nineties it was quite a common practice of leading growers to haul into their groves leaves, leaf-mold, and other organic materials, in addition to what could be produced by growing cover crops in the grove. This is still good practice. The fact is generally recognized that the cover crop grown during the rainy season takes up water soluble plant foods, preventing their loss by leaching, and returns these plant foods to the soil later on when the cover crop plants decay. In addition, a very desirable form of organic matter is supplied. If a legume is grown, additional nitrogen is captured from the air and added to the soil. It can be pointed out that a ton of ordinary grass, for example, contains as much nitrogen, phosphoric acid and potash as 175 boxes of citrus fruits, and a ton of crotolaria contains more than twice that amount of nitrogen. However, one of the most important functions of organic matter is not generally recognized by laymen growers. That is, the part it plays in balancing the plant food in the soil. It is known that through the decomposition of organic matter the capacity of the soil water as a solvent agent is increased. Thus, the insoluble mineral plant foods, such as calcium carbonate, insoluble phosphates, and compounds of potassium and magnesium, are made available to the citrus trees.

The presence of decomposing organic matter in the soil at all times is, therefore, essential in maintaining conditions which enable citrus trees to use applied commercial fertilizers most effectively and most efficiently in the production of fruit.

How much of this bulky organic matter to the acre does a citrus grove need? We don't know that we have the answer to that question. We can only say that we have never seen too much organic matter in a citrus grove, when properly handled. We have seen more than 10 tons of crotolaria, air-dry, produced per acre in a young citrus grove, and left on the ground with excellent results. In many instances growers have hauled into their groves a much greater tonnage of organic matter with most satisfactory results. In a recent grove management survey in one of the leading orange-producing counties in California it was found that 15 to 18 tons of coarse organic matter per acre, annually, were used by the most successful growers.

In grapefruit groves in Arizona, up to 35 tons per acre have been applied annually. An agronomist working in the West says the fertility of a soil is measured by its capacity for decomposing organic matter. If this is true with reference to Florida, our citrus soils should be very fertile when their full capacity for decomposing organic matter is supplied. Decomposition in these soils is very rapid, owing to their porus condition, high temperature, and heavy rainfall.

Occasionally we hear a grower say that too much cover crop, particularly beggar weed or crotolaria, will cause dieback and ammoniation. This is another way of saying that soils are sometimes found very deficient in copper, for these diseases are due to copper deficiency and not to too much cover crop or too much organic matter. In fact, we find such citrus diseaeses as dieback, ammoniation, splitting of fruit, frenching, and wither tip associated with a deficiency of organic matter in such a manner as to point rather definitely to this soil deficiency as an important contributing factor. Where any of these diseases exist, nitrogen and other plant foods will be wasted until the conditions are corrected.

In many instances the total tonnage of cover crop material can be increased by running the roller cutter over the crop in July or August. Much material is usually available at reasonable cost to haul into the groves. In areas where peanuts are being grown for the first time, some spoiled hay may be available this year. It is preferable that bulky organic material be hauled into the grove before the end of the rainy season. This will give time for it to partially rot down so that it can be more easily cut in with the fall discing. We should prepare for a shortage of nitrogen during the emergency.

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## ANALYSIS OF DATA RELATIVE TO THE MATURITY OF FLORIDA EARLY AND MIDSEASON COMMON SWEET ORANGES, SEASONS 1938, 19339 AND 1940

(Continued from page 11)

to 14. Previous to that period in 1940 the percentages of oranges which met specified minimums were rather irregular compared with those for the remainder of the season and with those of the 1938 and 1939 seasons. Possibly this irregularity may be due to the relatively small quantity of fruit that was moved during the period.

It will be noted that during the 1938 season the percentage of oranges that contained 5 gallons or more of juice was considerably higher than that during the 1939 and 1940 seasons.

**Percentages of Oranges that Met the "A" Specification**

The percentages of oranges that met the "A" specification during weekly periods in 1938, 1939, and 1940 are shown in table 4.

During 1939 the percentages that met the "A" specification were much lower than those in 1938 and 1940. This was because early in the fall of 1939, oranges were lower in solids than in either of the other 2 years. Beginning with the week of November 19 to 25, there was only a relatively small difference in the percentage of fruit meeting the "A" specification for each of the 3 years.

**"A" Specification 1/**

This specification requires a minimum of not less than 9 percent total soluble solids, five-tenths of 1 percent anhydrous citric acid, and a graduated ratio as shown below:

| Total soluble solids | Maximum anhydrous citric acid | Minimum ratio of total soluble solids to anhydrous citric acid |
|---|---|---|
| Percent | Percent | |
| 9.0 | .947 | 9.50 to 1 |
| 9.1 | .963 | 9.45 to 1 |
| 9.2 | .979 | 9.40 to 1 |
| 9.3 | .995 | 9.35 to 1 |
| 9.4 | 1.011 | 9.30 to 1 |
| 9.5 | 1.027 | 9.25 to 1 |
| 9.6 | 1.043 | 9.20 to 1 |
| 9.7 | 1.060 | 9.15 to 1 |
| 9.8 | 1.077 | 9.10 to 1 |
| 9.9 | 1.094 | 9.05 to 1 |
| 10.0 | 1.111 | 9.00 to 1 |
| 10.1 | 1.128 | 8.95 to 1 |
| 10.2 | 1.146 | 8.90 to 1 |
| 10.3 | 1.164 | 8.85 to 1 |
| 10.4 | 1.182 | 8.80 to 1 |
| 10.5 | 1.200 | 8.75 to 1 |
| 10.6 | 1.218 | 8.70 to 1 |
| 10.7 | 1.237 | 8.65 to 1 |
| 10.8 | 1.256 | 8.60 to 1 |
| 10.9 | 1.275 | 8.55 to 1 |
| 11.0 | 1.294 | 8.50 to 1 |
| 11.1 | 1.306 | 8.50 to 1 |
| 11.2 | 1.318 | 8.50 to 1 |
| 11.3 | 1.329 | 8.50 to 1 |
| 11.4 | 1.341 | 8.50 to 1 |
| 11.5 | 1.353 | 8.50 to 1 |
| 11.6 | 1.365 | 8.50 to 1 |
| 11.7 | 1.376 | 8.50 to 1 |
| 11.8 | 1.388 | 8.50 to 1 |
| 11.9 | 1.400 | 8.50 to 1 |
| 12.0 | 1.412 | 8.50 to 1 |
| 12.1 | 1.424 | 8.50 to 1 |
| 12.2 | 1.435 | 8.50 to 1 |
| 12.3 | 1.447 | 8.50 to 1 |
| 12.4 | 1.459 | 8.50 to 1 |
| 12.5 | 1.471 | 8.50 to 1 |
| 12.6 | 1.482 | 8.50 to 1 |
| 12.7 | 1.494 | 8.50 to 1 |
| 12.8 | 1.506 | 8.50 to 1 |
| 12.9 | 1.517 | 8.50 to 1 |
| 13.0 | 1.53 | 8.50 to 1 |
| 13.1 | 1.541 | 8.50 to 1 |
| 13.2 | 1.553 | 8.50 to 1 |
| 13.3 | 1.565 | 8.50 to 1 |
| 13.4 | 1.576 | 8.50 to 1 |
| 13.5 | 1.588 | 8.50 to 1 |
| 13.6 | 1.600 | 8.50 to 1 |
| 13.7 | 1.612 | 8.50 to 1 |
| 13.8 | 1.624 | 8.50 to 1 |
| 13.9 | 1.635 | 8.50 to 1 |
| 14.0 | 1.647 | 8.50 to 1 |
| 14.1 | 1.659 | 8.50 to 1 |
| 14.2 | 1.671 | 8.50 to 1 |
| 14.3 | 1.682 | 8.50 to 1 |
| 14.4 | 1.694 | 8.50 to 1 |
| 14.5 | 1.705 | 8.50 to 1 |
| 14.6 | 1.718 | 8.50 to 1 |
| 14.7 | 1.729 | 8.50 to 1 |
| 14.8 | 1.741 | 8.50 to 1 |
| 14.9 | 1.753 | 8.50 to 1 |
| 15.0 | 1.765 | 8.50 to 1 |
| 15.1 | 1.776 | 8.50 to 1 |
| 15.2 | 1.788 | 8.50 to 1 |
| 15.3 | 1.80 | 8.50 to 1 |
| 15.4 | 1.812 | 8.50 to 1 |
| 15.5 | 1.824 | 8.50 to 1 |
| More than 15.5 | ..... | 8.50 to 1 |

1/ This specification was used as a basis for the requirements of "A" Quality Juice as described in Amendment No. 1 "U. S. Standard for Internal Quality of Common Sweet Oranges," issued by the Agricultural Marketing Service, November 8, 1941.

**Percentages That Failed to Meet the "A" Specification**

Table 5 shows a comparison of the quantities and the percentages of oranges that failed to meet the "A" specification during the seasons 1938-39, 1939-40, and 1940-41. The percentages of fruit that failed to meet this specification are based upon the total movement of oranges throughout the entire season.

In table 6 the percentages that failed to meet "A" specification are based upon shipments that moved from October 1 to December 30.

It will be noted that a much larger percentage of fruit failed to meet the "A" specification in 1939 than in either the 1938 or the 1940 season. This failure was due mainly to the lower solid content in oranges during the early part of the 1939 season.

## MAYO WARNS GROWERS AGAINST USE OF ARSENIC ON ORANGES, TANGERINES

Nathan Mayo, Commissioner of Agriculture, states that rumors are coming to him that on account of the rationing of tires and gasoline, and a probable shortage of inspectors, the Department might lighten up, to a certain extent, on arsenic enforcement.

This rumor, wherever it came from, is absolutely untrue, and the Commissioner hastens to inform the citrus growers and the general public that the arsenic law will be rigidly enforced, to the letter, as far as humanly possible. He already has inspectors in the field and expects to keep them there, and as the season advances more inspectors will be added if necessary.

It is strictly against the law to use arsenic on oranges and tangerines, and before the next shipping season starts it is the Commissioner's intention to have every grove in the State inspected.

The Commissioner states that it is no pleasant duty to destroy fruit, but he has no alternative in the matter.

Mr. Mayo urges all grove owners and caretakers to be sure that their spray tanks are thoroughly washed out, and every trace of arsenic eliminated, before applying spray to their oranges and tangerines.

He also warns against the planting of cotton, truck crops, etc., near citrus groves. It is necessary to spray such crops with arsenic to kill insects, etc., and in the past some violations of the arsenic law as to oranges and tangerines have been caused by the wind blowing into a grove the arsenic spray or dust used in spraying fields of cotton or vegetables. Mr. Mayo urges that all such crops be planted far enough away from citrus groves to avoid the possibility of any such contamination.

READ THE LYONIZER ON PAGES 12 AND 13

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## Neglect of Scale or Rust Mite Infestations or Lack of Pruning . . . May Cost You A Profitable Crop.

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